Distributive Training Technology Project

Army National Guard Division Support

MMS-600 Site Planning and Preparation Guide

6537–SE-SITGU–001

CM Released 4 Nov 2002

CDRL Sequence Number N/A
Data Item Description N/A

Revision A
4 November 2002

Contract Number: BPA-DL-K1102BJ4200
Task Order Number: K1102BJ4201

Prepared for

PMO DTTP
Jefferson Plaza 1
1411 Jefferson Davis Highway
Arlington, VA 22202–3231

Prepared by
Science Applications International Corporation (SAIC)
Technical Services Company (TSC)
7910 Science Applications Court
Vienna, VA 22182

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1. INTRODUCTION

This *Site Planning and Preparation Guide*, Version MMS 600, is distributed by the National Guard Bureau (NGB) Distributive Training Technology Project (DTTP) to assist state and local National Guard personnel in selecting and preparing a site for installation of a Multi-Media Scalable (MMS) Type 600 (MMS 600) classroom.

The MMS 600 classroom configuration is a flexible and uniform design that provides:

- Two classroom versions, Standard and Origination;
- A scalable design that can provide any number of student work stations from three to 18, depending on the needs, conditions, and resources of the NGB, state National Guard units, and local communities;
- LCD Projection System;
- A single-configuration for the classroom Network Rack, Integrated Information Services (IIS) Rack (if applicable), and Instructor Desk;

The MMS 600 installations will use the existing DTTP facilities. The sites will be modified as specified in this document to accommodate the MMS 600 installations.

Although the MMS 600 classroom design is scalable, the NGB is currently fielding the primary configuration described in the following table:

Table 1. Primary MMS-600 Configurations

Components	MMS 600 classroom
1. Student workstations	Varies
2. Instructor Desk with Equipment	1
3. Network Rack	1
4. Projector Cart	1
5. IIS Rack (if applicable)	1
6. Chairs	Varies
7. Printer table	1
8. Additional tables	---

An electronic copy of this *Site Planning and Preparation Guide* and other DTTP documents may be found on the NGB DTTP web site at http://www.dttp.ngb.army.mil. Questions or comments regarding this document and the guidelines described herein should be directed to the following: Phone: 571-226-1814.

2. STRUCTURAL LAYOUT

A Multi-Media Scalable (MMS) Type 600 (MMS 600) classroom requires a single primary-use classroom. Secondary areas, such as administrative spaces, storage closets, and equipment/maintenance rooms are not included in the primary-use room(s).

DTTP classrooms should comply with applicable federal, state, local, and military building and fire codes and regulations. The facility layout should offer convenient access for administrators, students, and visitors. DTTP personnel should be able to greet and assist visitors promptly upon entering the building or classroom. If the DTTP does not have a separate outside entrance, a sign with clear directions to the DTTP facility should be placed immediately inside the primary entrance and, if necessary, along the route to the facility.

Adequate wall space to accommodate a projector screen in the front of the room needs to be available. The screen is mounted on a wall like a picture frame, and there can be no obstruction such as a white board.

It is recommended that the Network Rack provided with the MMS 600 classroom be placed in a separate room to reduce ambient noise and prevent overheating in the classroom. The room with the Network Rack should be no further than 250 feet from the MMS classroom.

The following table lists guidelines for the structural layout of a MMS 600 classroom facility:

Table 2. Structural Layout Guidelines for MMS-600 Classroom

Item	MMS 600 Classroom
Space factors	Instructor: 33 sq ft Per student: 44 sq ft Equip racks: 16 sq ft Projector Cart: 9 sq ft Print area: 23 sq ft Projector Screen: 35 sq ft (wall space) Aisle space: 160 sq ft Site admin: 64 sq ft (Recommended)
Administrative office space	Recommended, 8 x 8 ft. min. with desk, chair, file cabinet
Total room size	241 sq ft + (# of workstations multiplied by 44 sq ft)
Class entrance	Easily accessible
Restrooms	Easily accessible
Furniture	Furniture will be centrally procured by the NGB unless otherwise contracted through the USP&FO Purchasing and Contracting Office.

Table 2. Structural Layout Guidelines for MMS-600 Classroom	
Item	**MMS 600 Classroom**
Handicap Access	DTTP classroom requirements under the Americans with Disabilities Act (ADA) are handled on a case-by-case basis, depending on the requirements of the State where the classroom is located. Classrooms located in armories do not need to be ADA compliant. ADA requirements include but are not limited to: • Wheelchair-accessible entrances, aisles, and restrooms • Restrooms equipped for use by disabled persons, including wide out-swinging stall door, required clearances at entry doors, grab bars, required heights of fixtures • Required door widths, wall switch heights, door latches, raised lettering for room identification, faucet handles, insulated hot water pipes
Paint	Quality interior semi-gloss or flat, latex-base, washable, durable, colorfast, uniform color (light pastel, preferably pastel blue and no excessive gray), no distinct patterns
Carpet	Extra-heavy traffic class with anti-shock treatment (e.g., BASF Zefstat), ADA compliant (0.6 min. static coefficient of friction), blue pattern preferable
Windows	Shades, curtains, blinds, tinting, etc., to reduce sunlight, glare, and noise

3. ACOUSTICS

Ambient noise in a DTTP classroom can distract students and prevent them from hearing and participating in learning activities. Where ambient noise exceeds the recommended level of 45-decibel (dB) design modifications should be made to reduce the noise or a new site should be selected.

Procedures that can help to reduce noise levels in a DTTP classroom are as follows:

- Constructing walls from varied materials, such as drywall (also called plasterboard or sheet rock) and wooden studs, rather than one solid substance, such as cement or metal
- Placing extra-thick or double sheets of drywall on wall surfaces
- Installing sound-absorbent materials on walls, floors, and ceilings; and acoustical lining in heating, ventilation, and air conditioning (HVAC) ductworks
- Installing “dog-leg” turns in HVAC ducts
- Sealing off all wall openings
- Placing rubber gaskets and insulating strips on door jambs
- Using sound-rated fluorescent light ballasts
- Locating the classroom far from noisy facilities, such as high-traffic corridors, streets, and parking lots; and vibration-generating equipment such as HVAC compressors and fans
- Adding shades, curtains, or blinds to windows
- Setting HVAC air velocity on low.

4. HEATING, VENTILATION, & AIR CONDITIONING

Heating, ventilation, and air conditioning (HVAC) equipment are essential for MMS configurations. Dedicated climate control equipment with independent controls for the classroom and equipment room is recommended. The room temperature should be in the normal range (72-76 degrees Fahrenheit), and a relative humidity of 30 to 50 percent is recommended.

The heat loads generated by DTTP classrooms vary depending on several factors, including the amount and type of DTTP equipment installed, the number and type of light fixtures, and the number of persons in the room. The approximate hourly heat loads generated by these primary load factors, given in British Thermal Units (BTUs), are listed in Table 3:

Table 3. Heat Load of Primary Classroom Components

Primary Load Factor	Approximate Heat Load
1. Light fixtures	341 BTUs per 100 watts
2. Persons in room	330 BTUs per person
3. 1 workstation	900 BTUs per Hour (max)
4. Instructor Desk with Equipment	2000 BTUs per Hour (max)
5. LCD Projector	1000 BTUs per Hour (max)
6. Miscellaneous External Classroom Equipment	1600 BTUs per Hour (max)
7. Classroom Equipment Rack	12000 BTUs per Hour (max)
8. IIS Rack (if applicable)	1800 BTUs per Hour (max)

Given these values, the heat load for an MMS 600 classroom containing all the optional components can typically run as high as 48,000 BTUs per hour. Therefore, installation of a separate HVAC system for larger DTTP facilities is recommended.

5. LCD PROJECTOR AND SCREEN

Note: This section relates specifically to the installation of the Sony VPL-PX32 LCD projector. Other projectors may have different installation requirements.

A Sony LCD projector is the primary display of visual information in the classroom. The projector mounted from the ceiling is the normal configuration. An alternate configuration has the projector mounted from a mobile cart. Whether the projector will be mounted from the ceiling or on the floor, provisions need to be made for electrical, network drops, ventilation, and distance from screen.

A critical requirement for projector installation is the distance from the projector lens to the projector screen or (see Figure 5-1). The projector lens shall be no more than 136 inches or be no less than 104 inches in distance from the front of projector screen. The optimal distance is 120 inches or 10 feet. This is based on a projector screen of the size 60.5" X 46.5". If the projector is mounted on a mobile cart, then there is flexibility of adjustment. If the projector is mounted from the ceiling, extra care is needed in determining the proper location, due to the permanent and inflexible nature of a ceiling installation.

Remember that the distance is taken from the projector lens to the screen. Figure 5-2 shows an offset of 2-1/4" from the center of the lens to the center of the projector body. The projector is installed so that the projector lens is perpendicularly and horizontally centered to the projector screen, not the center of the projector body.

When mounting the projector from the ceiling, the projector needs one foot or more vertical distance between the projector and the ceiling surface. This is to accommodate ventilation needs. Refer to Figure 5-1.

Regarding mounting hardware, if the ceiling is *soft* such as a tiled drop ceiling, then there needs to be a measurement from the *hard ceiling*, or the actual mounting surface of the mount accessory. The distance from the hard ceiling to the soft ceiling, plus one foot is the measurement for the extension device that is part of the mounting accessory, sold separately from the projector.

The projector screen or the interactive should be mounted in the front of the classroom at a distance of at least 48 inches from the floor to the bottom of screen frame. The screen mounts flat on the wall like a picture frame or it may be of the pull-up variety. There can be no obstructions on the wall where the screen will be installed. The projector screen specifications are valid for a ceiling or a cart projector installation.

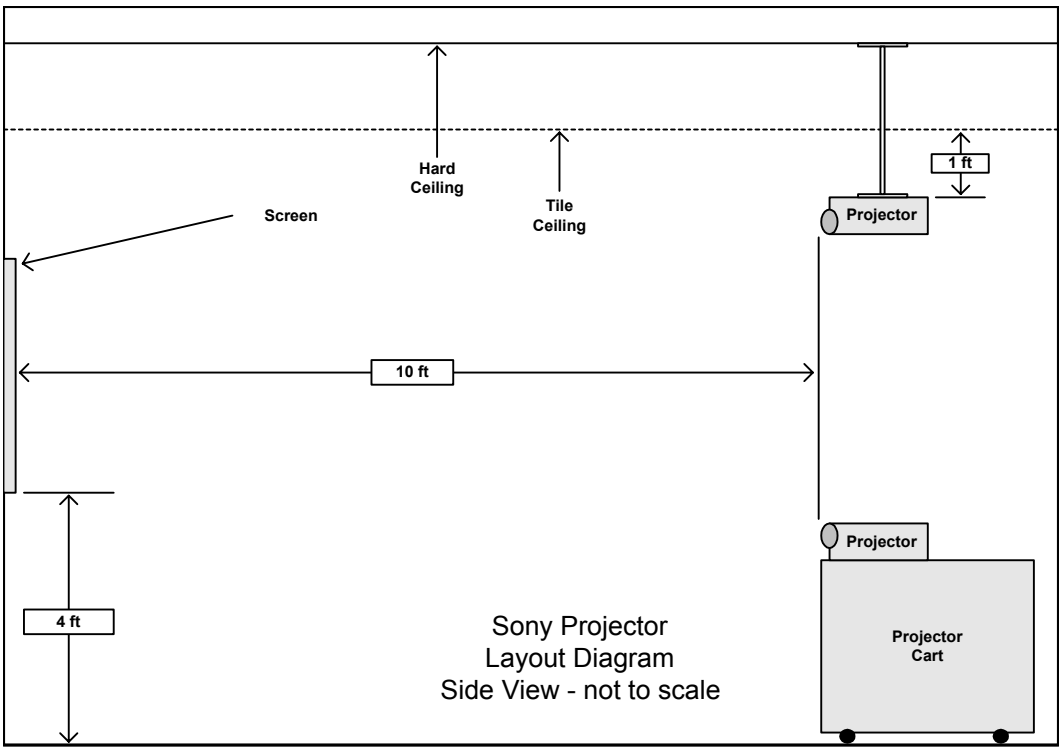

Figure 5-1. Sony LCD Projector Layout Diagram

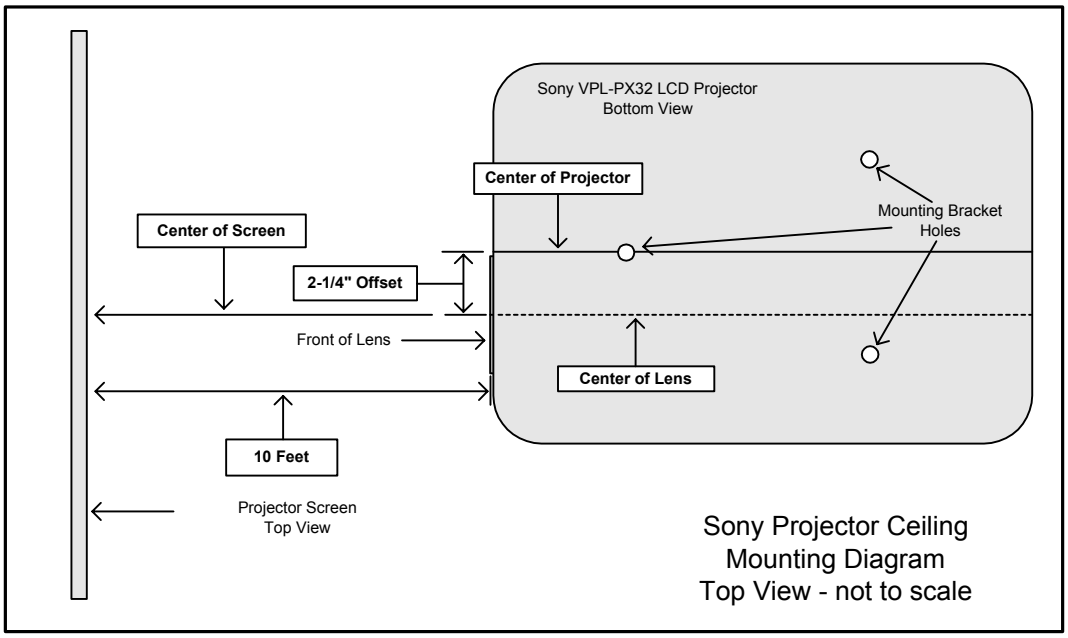

Figure 5-2. Sony LCD Projector Ceiling Installation Diagram

6. LIGHTING

Fluorescent lighting is recommended since it offers higher efficiency than incandescent lighting and minimizes heat gain. The lighting should provide about 80-100 foot-candles of light on participants and 60-70 foot-candles of background light. The minimum guideline is 50-80 foot-candles of illumination on work surfaces.

Each fluorescent light fixture should be equipped with "egg crate"-style directional louvers or prismatic lenses having a reflective coating and a grid size about one inch square to diffuse the light, minimize shadows, and reduce the glare on computer screens and video monitors. The glare on video monitors should be no more than 30 foot-candles. If the classroom has windows, they should be treated with shades, curtains, blinds, tinting, or other treatments that reduce sunlight and glare.

Lighting in a MMS 600 configuration should be color-corrected to allow the video cameras to provide an enhanced video image for remote sites. For this purpose, fluorescent bulbs that provide a color temperature of 3,500 degrees Kelvin and a color-rendering index of approximately 80 is recommended (example: Sylvania Designer 835 bulb).

7. ELECTRICAL POWER

The minimum power guidelines for the electrical panels in MMS 600 classrooms are 130 amps for configurations of 6 or less student workstations, 150 amps for 7-12 student workstations, 220 amps for 13 or more student workstations. The uninterrupted power supply (UPS) in the Classroom Equipment Rack requires a dedicated 30-amp circuit with an NEMA L5-30R twist-lock outlet for the exclusive use of the rack. If these circuits and outlets are not available and convenient to the racks, site personnel must install them to ensure an adequate power supply to each rack.

Electrical circuits should provide evenly distributed electrical availability throughout the classroom. Electrical outlets should also be properly wired and grounded, in accordance with local building and electrical codes.

For larger sites, such as MMS 600 classrooms with 13 workstations or more, installation of a separate electric panel to provide electric power to the DTTP classroom(s) is recommended. If the primary electrical feed to the building has insufficient capacity to support the additional power demand of the DTTP facility, arrangements must be made with the local electric utility company to provide additional power. After the electric power is assured, a separate electrical panel should be installed in the electric closet of the classroom.

The size of the panel depends on the number of workstations planned for the facility. The panel should have spare capacity for one or two additional dedicated 20-amp circuits to accommodate future expansion. Where possible, a separate meter or sub-meter should be installed in front of the DTTP panel for separate billing, providing an accurate measurement of the classroom's operational utility costs. The table below provides the recommended electrical panel schedule for an MMS 600 classroom.

Table 4. MMS-600 Electrical Panel Schedule

Dedicated Circuit	Amps	Volts	Service to	Receptacle
1	20	110	1-4 workstations	NEMA 5-20R
2	20	110	1-4 workstations	NEMA 5-20R
3	20	110	1-4 workstations	NEMA 5-20R
4	20	110	1-4 workstations	NEMA 5-20R
5	20	110	1-4 workstations	NEMA 5-20R
6	20	110	1-4 workstations (optional)	NEMA 5-20R
7	20	110	1-4 workstations (optional)	NEMA 5-20R
8	20	110	1-4 workstations (optional)	NEMA 5-20R
9	20	110	1-4 workstations (optional)	NEMA 5-20R
10	20	110	1-4 workstations (optional)	NEMA 5-20R
11	20	110	1-4 workstations (optional)	NEMA 5-20R
12	20	110	Instructor Desk with Equipment	NEMA 5-20R
13	20	110	LCD Projector	NEMA 5-20R
14	30	110	Network Equipment Rack	NEMA L5-30R twist-lock

Table 4. MMS-600 Electrical Panel Schedule				
15	20	110	IIS Classroom Rack (if applicable)	NEMA 5-20R

8. SECURITY

The USP&FO, site manager, and armory commander or building supervisor, in accordance with local guidelines and a "reasonable and prudent" standard, should coordinate security for DTTP facilities. Due to the presence of valuable equipment at the site, the doors and windows of the classroom must be provided with secure locks.

9. FIRE SAFETY

DTTP classrooms must comply with federal, state, local, and Base building codes and fire regulations. DTTP classrooms are equipped with electronic equipment that generates significant heat and power loads. Classroom preparations should include reasonable and prudent provisions for fire safety and preparations for other emergencies.

Precautions for fire safety and emergency preparedness may include the following steps, but these recommendations are *not* requirements or prerequisites for the installation and operation of DTTP classrooms:

- Constructing the facility with fire-resistant materials; accessible and clearly marked exits and escape routes; adequate HVAC provisions; and in accordance with federal, state, and local building codes and fire regulations
- Installing fire detection equipment in DTTP classrooms, such as smoke detectors, fire alarms, electronic sensors, and video surveillance
- Equipping rooms with fire suppression equipment, such as fire extinguishers, sprinklers, hoses, tools, etc.
- Providing other emergency equipment, such as first aid supplies, tools, ladders, blankets, restroom facilities, water supplies, etc.
- Establishing, promulgating, and practicing fire safety and emergency preparedness standards and procedures for the classroom.

10. TELECOMMUNICATIONS

Telecommunications requirements vary with each classroom configuration. The lack of availability of the required telecommunications circuits at some sites or the cost of installing such lines may influence the selection of a DTTP classroom configuration.

All MMS 600 classrooms require a minimum of two "plain old telephone service" (POTS) lines with touch-tone service. The State National Guard is responsible for ensuring the two POTS lines are ordered and installed in the DTTP classroom. Each of these lines must be a direct, single, dedicated, commercial telephone line. In addition to the two POTS lines, the MMS configurations require installation of one T-1 line. If the classroom site is co-located with the NGB's State Area Command (STARC) or regional Hub, a T-1 line does not need to be installed. In these cases, a multi-mode fiber link, SC-SC termination, connecting the STARC and the classroom needs to be installed.

There may already be a T-1 line in the current classroom. If not, either the NGB or the State National Guard, or their designees order the T-1 line. After the T-1 line is ordered, the local exchange carrier (LEC) is responsible for installing the line. The lead-time required to install a T-1 line is a minimum of 90 days from the time the line is ordered. The State National Guard is responsible for ensuring the T-1 is extended from the LEC's campus demarcation, or "demarc," to the location of the Network Rack. If the LEC delivers the circuit to the post or campus demarc, the State National Guard must have the circuit extended to the classroom service delivery point (SDP), where the Network Rack is located.

The required telecommunications bandwidth for all MMS 600 classrooms is two POTS lines and one T-1 line.

11. CLASSROOM BUILDOUT

The EIA/TIA 568B Commercial Building Wiring Standard must be followed for all Category 5 UTP data drops installed in an MMS 600 classroom. Sites will follow site survey instructions regarding the installation of all data drops, electrical power receptacles, and POTS lines in the classrooms. These instructions will be given as part of the site survey report submitted to the NGB by the classroom installers.

The following *minimum* specifications must be followed to ensure full MMS 600 classroom functionality:

- Five CAT-5 data runs between the instructor desk and the Network Rack
- One CAT-5 data run between the instructor desk and the instructor camera
- One CAT-5 data run between the instructor desk and the student camera
- Two CAT-5 data runs between the instructor desk and the LCD Projector
- One CAT-5 data run between the printer table and the Network Rack
- One CAT-5 data run between every student workstation and the Network Rack
- Two dedicated POTS lines installed at the printer table (1 for the cordless phone and fax, and 1 for the Polycom conferencing system)
- One T-1 line (or SC-SC termination multi-mode fiber link for co-located site) from the STARC or Regional Hub to the Network Rack
- One dedicated 20 amp NEMA 5-20R receptacle per 4 workstations
- One shared 20 amp quadruplex NEMA 5-20R receptacle for the printer table (shared with a workstation circuit)
- One dedicated 20 amp NEMA 5-20R receptacle for the instructor desk
- One dedicated 20 amp NEMA 5-20R receptacle for the LCD projector
- One shared 20 amp NEMA 5-20R receptacle for the instructor camera
- One shared 20 amp NEMA 5-20R receptacle for the student camera
- One dedicated 30 amp NEMA L5-30R twist-lock receptacle for the Network Rack
- One dedicated 20 amp NEMA 5-20R receptacle for the IIS Rack (if applicable)

The Instructor Desk, Network Rack, IIS Rack, printer table, and chairs are DTTP classroom standard sizes. The student desks are available in three different sizes: 48” x 31” (standard), 42” x 31”, and 36” x 31”. The size of the student desks for each DTTP classroom is defined in the *Site Survey Report* submitted to the state National Guard point of contact (POC) for signature after completion of the site survey and posted on the NGB DTTP web site (http://www.dttp.ngb.army.mil).

The two diagrams on the following pages depict typical layouts for an MMS 600 classroom (Figure 11-1) and the MMS 600 Classroom Equipment Rack and IIS Rack Room, if applicable (to be located in a nearby equipment room) (Figure 11-2).

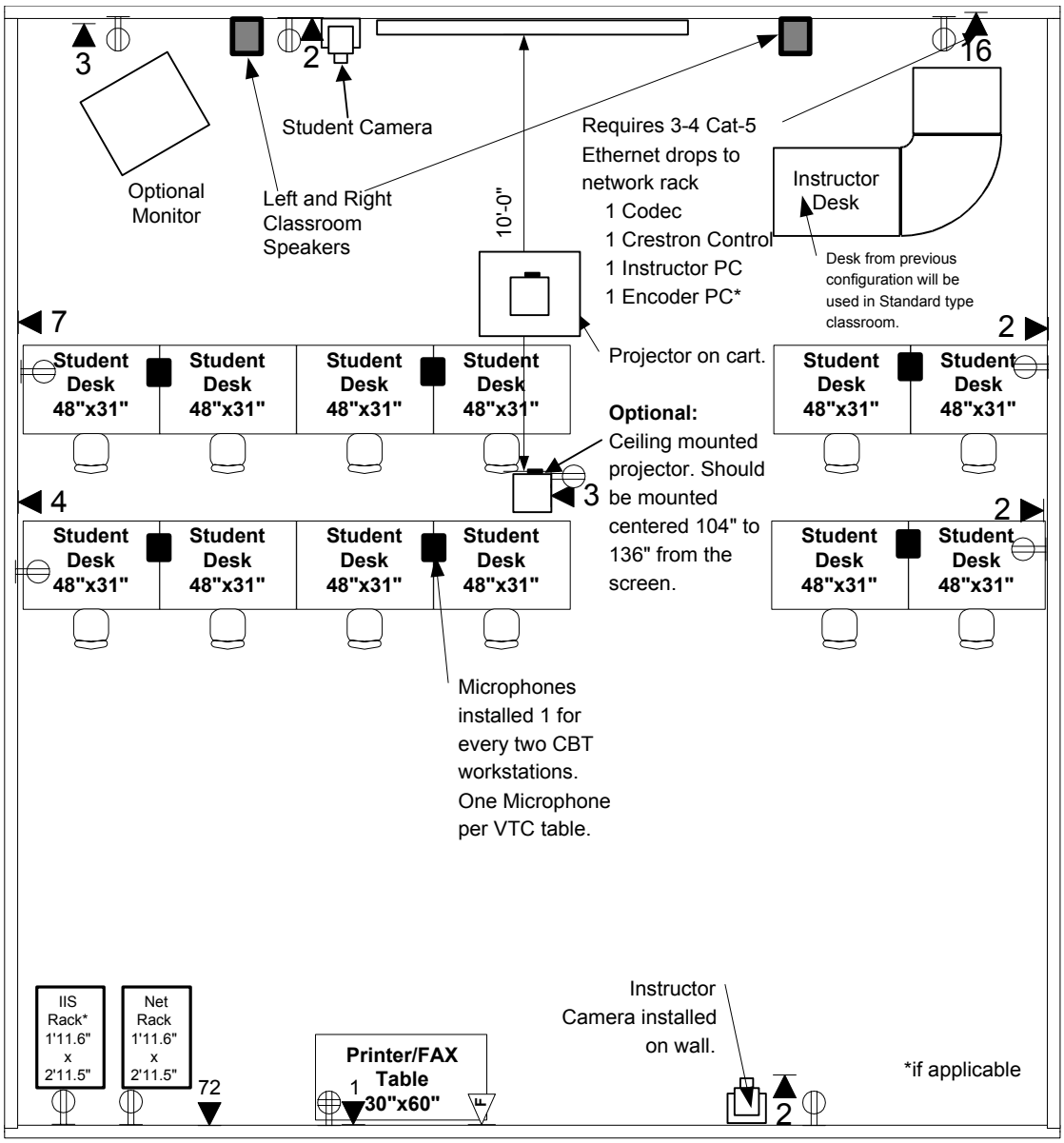

Figure 11. Typical Layout of MMS 600 Classroom with 12 Student Workstations

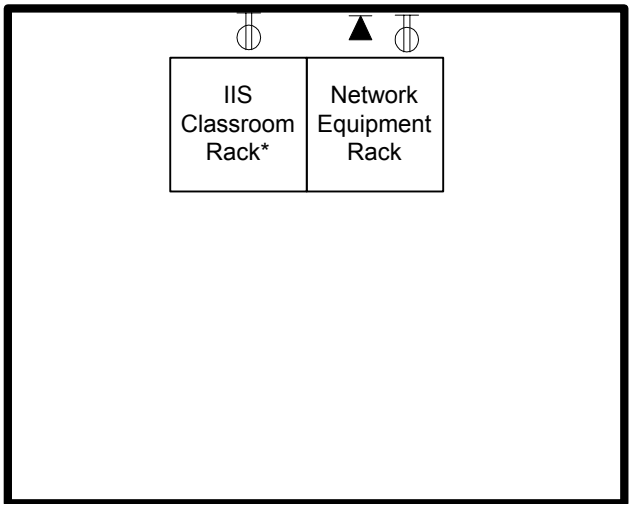

Figure 11-1. MMS 600 Network Equipment Rack and IIS Rack Room Layout

- **If Applicable.** This is a recommended equipment room to be located not more than 250 feet from the MMS classroom.

APPENDIX A. PROJECTOR MOUNT VENDORS

Table A-1. Projector Mount Vendors			
Projector Mount for the Sony VPL-PX32			
	Premier Mounts	**Sony Corp.**	**Draper**
Basic Kit Model #	PBM-632L (color Black)	PSS610//A	Aero 1318
MSRP	$265.00	$300.00 (not MSRP, web)	$400.00
Extension Kit #	AST-2446 (24"-46")	PSS-10	1214, 2030, 2636, 3444, 4252
MSRP	$195.00	approx. $650	Included
Web Site	http://www.premiermounts.com/Product.asp_Q_ProductID_E_1453_A_PartID_E_662	http://bpgprod.sel.sony.com/bpcnav/app/99999/12/99/59156.99999.product.BPC.html	http://www.draperinc.com/
Phone #	800-368-9700		800-238-7999
Purchased thru Dealer or Direct	Both Recommended	Dealer	Dealer